

What is claimed is:

1. A thermally conductive assembly, comprising:

a flexible, thermally conductive elastomeric member comprising a first side, an opposing second side, and a plurality of edges connecting said first side and said second side; and
an electrically insulating first coating encapsulating said elastomeric member, wherein said first coating prevents release from said thermally conductive assembly of one or more substances emitted by said elastomeric member.

2. The thermally conductive assembly of claim 1, wherein said first coating further comprises:

an inner layer having a first side and an opposing second side;

an outer layer having a first side and an opposing second side;

wherein said first side of said inner layer is disposed adjacent said elastomeric member;

and

wherein said second side of said inner layer is disposed adjacent said first side of said outer layer.

3. The thermally conductive assembly of claim 2, wherein said inner layer is formed from the group consisting of natural rubber, polybutadiene, polyisoprene, polystyrene, polyethylene, polychlorotrifluoroethylene, polytetrafluoroethylene, perfluoroalkoxy Teflon®, ethylene / chlorotrifluoroethylene copolymer, ethylene / tetrafluoroethylene copolymer, polypropylene, polyethylene / polypropylene copolymer, fluorinated ethylene-propylene copolymer, polyethylene terephthalate, polypropylene terephthalate, polybutylene terephthalate, polynaphthalene terephthalate, polyvinylacetate, polyamide, polyimide, polyamideimide,

8 polyurethane, polyvinyl fluoride, polyvinylidene fluoride, polyvinyl chloride, polyvinylidene
9 chloride, and mixtures thereof.

1 4. The thermally conductive assembly of claim 2, wherein said outer layer is formed
2 from the group consisting of natural rubber, polybutadiene, polyisoprene, polystyrene,
3 polyethylene, polychlorotrifluoroethylene, polytetrafluoroethylene, perfluoroalkoxy Teflon®,
4 ethylene / chlorotrifluoroethylene copolymer, ethylene / tetrafluoroethylene copolymer,
5 polypropylene, polyethylene / polypropylene copolymer, fluorinated ethylene-propylene
6 copolymer, polyethylene terephthalate, polypropylene terephthalate, polybutylene terephthalate,
7 polynaphthalene terephthalate, polyvinylacetate, polyamide, polyimide, polyamideimide,
8 polyurethane, polyvinyl fluoride, polyvinylidene fluoride, polyvinyl chloride, polyvinylidene
9 chloride, and mixtures thereof.

1 5. The thermally conductive assembly of claim 1, further comprising a metal layer
2 disposed between said first side of said inner layer and said elastomeric member.

1 6. The thermally conductive assembly of claim 5, wherein said metal layer
2 comprises aluminum.

1 7. The thermally conductive assembly of claim 1, wherein said thermally conductive
2 assembly comprises a first surface and an opposing second surface, further comprising a semi-
3 solid material disposed on said first surface.

1 8. The thermally conductive assembly of claim 7, further comprising a semi-solid
2 material disposed on said second surface.

1 9. The thermally conductive assembly of claim 7, further comprising a pressure
2 sensitive adhesive disposed on said second surface.

1 10. The thermally conductive assembly of claim 1, wherein said thermally conductive
2 assembly comprises a first surface and an opposing second surface, further comprising a plurality
3 of hydrocarbons disposed on said first surface.

1 11. The thermally conductive assembly of claim 10, further comprising a plurality of
2 hydrocarbons disposed on said second surface.

1 12. The thermally conductive assembly of claim 10, further comprising a pressure
2 sensitive adhesive disposed on said second surface.

1 13. The thermally conductive assembly of claim 1, wherein said thermally conductive
2 assembly comprises a first surface and an opposing second surface, further comprising a pressure
3 sensitive adhesive disposed on said first surface.

1 14. A method to form a flexible thermally conductive assembly, comprising the steps
2 of:

3 providing a flexible, thermally conductive elastomeric member comprising a first side, an
4 opposing second side, and a plurality of edges connecting said first side and said second side;

5 heating said elastomeric member at a reduced pressure;

6 removing volatile components from said elastomeric member; and

7 encapsulating said elastomeric member with an electrically-insulating first coating.

1 15. The method of claim 14, further comprising the step of extracting said elastomeric
2 member using a solvent.

1 16. The method of claim 14, wherein said disposing step further comprises the steps
2 of:

3 forming a flexible enclosure;

4 inserting said elastomeric member into said flexible enclosure; and

5 sealing said flexible enclosure.

1 17. The method of claim 14, wherein said disposing step further comprises the steps

2 of:

3 providing a first sheet of polymeric material;

4 providing a second sheet of polymeric material;

5 disposing said elastomeric member between said first sheet of polymeric material and
6 said second sheet of polymeric material; and

7 bonding said first sheet of polymeric material to said second sheet of polymeric material
8 adjacent each of said plurality of edges.

1 18. The method of claim 14, further comprising the step of disposing a second coating
2 on said first coating.

1 19. The method of claim 18, wherein said second coating comprises a pressure sensitive
2 adhesive.

1 20. The method of claim 18, further comprising the step of disposing a third coating on
2 said first coating.

1 21. The method of claim 20, wherein said third coating comprises a plurality of
2 hydrocarbons.

1 22. A device, comprising:
2 an enclosure;
3 a plurality of heat dissipating components disposed within said enclosure; and
4 a flexible thermally conductive assembly disposed between said plurality of heat dissipating
5 electrical components and said enclosure, wherein said flexible thermally conductive assembly
6 comprises:

7 a flexible, thermally conductive elastomeric member comprising a first side, an opposing
8 second side, and a plurality of edges connecting said first side and said second side; and
9 an electrically-insulating first coating disposed on said elastomeric member, wherein said
10 first coating prevents release from said thermally conductive assembly of one or more substances
11 emitted from said elastomeric member.

1 23. The device of claim 22, wherein said plurality of heat dissipating electrical
2 components have differing dimensions.

1 24. The device of claim 22, wherein said first coating further comprises:
2 an inner layer having a first side and an opposing second side;
3 an outer layer having a first side and an opposing second side;
4 wherein said first side of said inner layer is disposed adjacent said elastomeric member;
5 and
6 wherein said second side of said inner layer is disposed adjacent said first side of said
7 outer layer.

1 25. The device of claim 24, wherein said inner layer is formed from the group
2 consisting of natural rubber, polybutadiene, polyisoprene, polystyrene, polyethylene,
3 polychlorotrifluoroethylene, polytetrafluoroethylene, perfluoroalkoxy Teflon®, ethylene /
4 chlorotrifluoroethylene copolymer, ethylene / tetrafluoroethylene copolymer, polypropylene,
5 polyethylene / polypropylene copolymer, fluorinated ethylene-propylene copolymer,
6 polyethylene terephthalate, polypropylene terephthalate, polybutylene terephthalate,
7 polynaphthalene terephthalate, polyvinylacetate, polyamide, polyimide, polyamideimide,
8 polyurethane, polyvinyl fluoride, polyvinylidene fluoride, polyvinyl chloride, polyvinylidene
9 chloride, and mixtures thereof.

1 26. The device of claim 24, wherein said outer layer is formed from the group
2 consisting of natural rubber, polybutadiene, polyisoprene, polystyrene, polyethylene,
3 polychlorotrifluoroethylene, polytetrafluoroethylene, perfluoroalkoxy Teflon®, ethylene /
4 chlorotrifluoroethylene copolymer, ethylene / tetrafluoroethylene copolymer, polypropylene,
5 polyethylene / polypropylene copolymer, fluorinated ethylene-propylene copolymer,
6 polyethylene terephthalate, polypropylene terephthalate, polybutylene terephthalate,
7 polynaphthalene terephthalate, polyvinylacetate, polyamide, polyimide, polyamideimide,
8 polyurethane, polyvinyl fluoride, polyvinylidene fluoride, polyvinyl chloride, polyvinylidene
9 chloride, and mixtures thereof.

1 27. The device of claim 24, further comprising a metal layer disposed between said
2 first side of said inner layer and said elastomeric member.

1 28. The device of claim 27, wherein said metal layer comprises aluminum.

1 29. The device of claim 22, wherein said flexible thermally conductive assembly
2 further comprises a first surface and a second surface, further comprising a semi-solid material
3 disposed on said first surface.

1 30. The device of claim 29, wherein said flexible thermally conductive assembly
2 further comprises a semi-solid material disposed on said second surface.

1 31. The device of claim 29, wherein said flexible thermally conductive assembly
2 further comprises a first surface and a second surface, further comprising a pressure sensitive
3 adhesive disposed on said second surface.

1 32. The device of claim 22, wherein said flexible thermally conductive assembly
2 further comprises a first surface and a second surface, further comprising a plurality of
3 hydrocarbons disposed on said first surface.

1 33. The device of claim 32, further comprising a plurality of hydrocarbons disposed
2 on said second surface.

1 34. The device of claim 32, further comprising a pressure sensitive adhesive disposed
2 on said second surface.

1 35. The device of claim 32, wherein said flexible thermally conductive assembly
2 further comprises a first surface and a second surface, further comprising a pressure sensitive
3 adhesive disposed on said first surface.

1 36. A method to transfer heat from a plurality of heat-dissipating components
2 disposed within an enclosure, comprising the steps of:

3 disposing a thermally conductive assembly between said plurality of heat-dissipating
4 components and said enclosure;

5 conducting heat generated by said heat-dissipating components through said flexible
6 thermally conductive assembly to said enclosure;

7 wherein said flexible thermally conductive assembly comprises:

8 a flexible thermally conductive elastomeric member comprising a first side, an opposing
9 second side, and a plurality of edges connecting said first side and said second side; and
10 an electrically-insulating first coating encapsulating said elastomeric member.

1 37. The method of claim 36, further comprising the step of preventing release from
2 said thermally conductive assembly of one or more substances emitted by said elastomeric
3 member.

1 38. The method of claim 36, wherein said first coating further comprises:

2 an inner layer having a first side and an opposing second side;

3 an outer layer having a first side and an opposing second side;

4 wherein said first side of said inner layer is disposed adjacent said elastomeric member;

5 and

6 wherein said second side of said inner layer is disposed adjacent said first side of said
7 outer layer.

1 39. The method claim 38, wherein said inner layer is formed from the group
2 consisting of natural rubber, polybutadiene, polyisoprene, polystyrene, polyethylene,
3 polychlorotrifluoroethylene, polytetrafluoroethylene, perfluoroalkoxy Teflon®, ethylene /
4 chlorotrifluoroethylene copolymer, ethylene / tetrafluoroethylene copolymer, polypropylene,
5 polyethylene / polypropylene copolymer, fluorinated ethylene-propylene copolymer,
6 polyethylene terephthalate, polypropylene terephthalate, polybutylene terephthalate,
7 polynaphthalene terephthalate, polyvinylacetate, polyamide, polyimide, polyamideimide,
8 polyurethane, polyvinyl fluoride, polyvinylidene fluoride, polyvinyl chloride, polyvinylidene
9 chloride, and mixtures thereof.

10 40. The method claim 38, wherein said outer layer is formed from the group
11 consisting of natural rubber, polybutadiene, polyisoprene, polystyrene, polyethylene,
12 polychlorotrifluoroethylene, polytetrafluoroethylene, perfluoroalkoxy Teflon®, ethylene /
13 chlorotrifluoroethylene copolymer, ethylene / tetrafluoroethylene copolymer, polypropylene,
14 polyethylene / polypropylene copolymer, fluorinated ethylene-propylene copolymer,
15 polyethylene terephthalate, polypropylene terephthalate, polybutylene terephthalate,
16 polynaphthalene terephthalate, polyvinylacetate, polyamide, polyimide, polyamideimide,
17 polyurethane, polyvinyl fluoride, polyvinylidene fluoride, polyvinyl chloride, polyvinylidene
18 chloride, and mixtures thereof.

1 41. The method claim 38, wherein said flexible thermally conductive assembly
2 further comprises a metal layer disposed between said first side of said inner layer and said
3 elastomeric member.

1 42. The method claim 41, wherein said metal layer comprises aluminum.

1 43. The method of claim 36, wherein said flexible thermally conductive assembly
2 further comprises a first surface and a second surface, further comprising a semi-solid material
3 disposed on said first surface.

1 44. The method of claim 43, further comprising a semi-solid material disposed on
2 said second surface.

1 45. The method of claim 36, further comprising a pressure sensitive adhesive
2 disposed on said second surface.

1 46. The method of claim 36, wherein said flexible thermally conductive assembly
2 further comprises a first surface and a second surface, further comprising a plurality of
3 hydrocarbons disposed on said first surface.

1 47. The method of claim 46, further comprising a plurality of hydrocarbons disposed
2 on said second surface.

1 48. The method of claim 46, wherein said thermally conductive assembly further
2 comprises a pressure sensitive adhesive disposed on said second surface.

1 49. The method of claim 36, wherein said flexible thermally conductive assembly
2 further comprises a first surface and a second surface, further comprising a pressure sensitive
3 adhesive disposed on said first surface.